

SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs

**REVISED
AGENDA ITEM: 9 – E (2)**

DATE: June 27-29, 2017

SUBJECT: Intent to Plan: SDSU MS in Medical Laboratory Science

South Dakota State University (SDSU) has submitted an Intent to Plan requesting approval to develop a Master of Science (MS) in Medical Laboratory Science (MLS). Approval or waiver of an Intent to Plan is required prior to submitting a formal program proposal. The program would focus on providing graduate students with skills that relate to the improvement, maintenance and success of the overall human-patient health care experience. MLS practitioners trained at the master’s level work with other health care professionals to ensure appropriate testing to improve health care delivery and patient care, serve as laboratory professionals in diagnostic testing settings, and fill both technical and administrative roles at medical laboratories. In addition, some graduates may serve as faculty at institutions that provide undergraduate education in medically related fields.

University Mission and System Strategic Goals

The proposed program supports the Statutory Mission and Board Policy mission of the university. SDCL 13-58-1 provides the mission of SDSU to “provide undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, home economics, nursing and pharmacy, and other courses or programs as the Board of Regents may determine.”

The proposal also aligns with the [SDBOR Strategic Plan](#) by expanding the number of graduate degrees awarded, increasing the number of graduate programs in the state, promoting research, and expanding educational opportunities in the areas of science, technology, engineering, and mathematics.

Related Programs in the System

No directly related programs currently exist in the System.

Workforce Need, Student Demand, Projected Graduates

SDSU notes that complex medical fields are simultaneously expanding in the region while also suffering from significant attrition through the retirement of current practitioners. The SD Public Health Workforce summary completed by the SD Department of Health indicated that the

(Continued)

DRAFT MOTION 20170627_9-E(2): I move to authorize SDSU to develop a proposal for a Master of Science in Medical Laboratory Science as presented.

state needs an additional 43 medical laboratory science professionals annually each year through 2022. The MLS program expects to enroll ten students per year and graduate ten students per year after full implementation.

Board Policy

SDSU is not requesting any exceptions to Board Policy.

Off Campus and Distance Delivery

SDSU currently plans only on campus delivery.

Budget and Resources

SDSU does not intend to request any new state resources to implement or maintain the proposed program.

Conditions for Approval

The approval of this request will be contingent upon the following:

1. The university will research existing curricula, consult with experts concerning the curriculum, and provide assurance in the proposal that the program is consistent with current national standards and with the needs of employers. This includes completion of an external review as required by [Board Policy 2:1](#).
2. The proposal will define the specific knowledge, skills, and competencies to be acquired through the program, will outline how each will be obtained in the curriculum and will identify the specific measures to be used to determine whether individual students have attained the expected knowledge, skills, and competencies.
3. The university will not request new state resources and the program proposal will identify the sources and amounts of all funds needed to operate the program and the impact of reallocations on existing programs.



**SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS**

Intent to Plan for a New Program

UNIVERSITY:	SDSU
DEGREE(S) AND TITLE OF PROGRAM:	M.S. in Medical Laboratory Science
INTENDED DATE OF IMPLEMENTATION:	Fall 2018

University Approval

To the Board of Regents and the Executive Director: I certify that I have read this intent to plan, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.

Barry H. Dunn

President of the University

5/5/2017

Date

1. What is the general nature/purpose of the proposed program?

South Dakota State University (SDSU) requests authorization to plan a M.S. in Medical Laboratory Science. Medical laboratory science (MLS) is a highly technical and complex discipline that is intimately involved in the improvement, maintenance and success of the overall human-patient health care experience. As the discipline moves forward, several important issues highlight the need for more advanced preparation within the MLS profession.

The MLS professions includes four levels of practice. The first level is a Medical Laboratory Technician (MLT), an associate degree professional that is primarily involved in low to moderately complex laboratory diagnostic testing. The second level is a baccalaureate-trained Medical Laboratory Scientist (MLS) serving as a primary laboratory professional responsible for moderate to high complexity testing. In addition, there are two graduate levels of practice in the medical profession. The master's level practitioner, is typically trained in high complexity and specialized testing in one of the laboratory core disciplines of the laboratory (i.e., microbiology, immunohematology, molecular diagnostics, hematology or clinical chemistry). The final level of practice, the Doctorate of Clinical Laboratory Science (DCLS), is an integral part of the health care team, consulting with the physician and other health care practitioners to ensure quality health care for all patients.

South Dakota State University is the home of the only baccalaureate university-based program that is accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). SDSU provides the majority of the moderate to highly complex laboratory professionals in South Dakota. The new M.S. in Medical Laboratory Science is designed to provide graduate level professionals trained in high complexity and specialized testing for the diagnostic laboratory to continue to maintain and improve quality health care in SD and the region as follows:

1. The American Society for Clinical Pathology (ASCP) has reported that over 30% of the unnecessary costs in health care are a result of the incorrect ordering of laboratory tests by practitioners.¹ Masters level advanced practice MLS practitioners can provide guidance and support in the development of new technical methods and their applications in such content areas as pharmacogenomics, molecular immunohematology, molecular diagnostics in microbiology, and hematology (i.e., blood abnormalities including leukemia). These professionals can work with other health care professionals to insure that the appropriate test and interpretation is ordered and improve the efficiency of health care delivery, effectively reducing costs and improving overall patient care.
2. In addition to improving the efficiency in the laboratory, there is an increased need for qualified laboratory professionals due to an expansion in the diagnostic testing within the laboratory. Employment of laboratory professionals is projected to grow from 2014 to 2024 by 16%, much faster than the average for all occupations. In addition, the aging population is expected to lead to a greater need to diagnose complex medical conditions and syndromes such as cancer or type 2 diabetes.^{2,3}
3. Graduate level laboratory science professionals will provide a community of scholars and technical professionals that are qualified to fill administrative roles and technical specialists (e.g. laboratory discipline supervisors, lead technical specialists) and serve as faculty in higher education. As laboratory professionals age and retire, the experience and knowledge that they have accumulated is difficult to replace. The laboratory labor force is currently aging at a 78% faster rate than the entire U.S. labor market, citing a rate of 4.5 percent compared to an overall labor market's 2.5 percent of aging.⁴ The rate of staff positions that take longer to fill (i.e., those that remain open for longer than six months) is the highest for molecular diagnostics and the rate for the corresponding supervisor positions is highest in the complex areas of immunohematology (18%) and diagnostic microbiology (12%).⁵ A national concern also exists that faculty shortages in the medical laboratory professions might also be an issue as older current faculty retire. While the ASCP's wage and Vacancy Surveys collect data on 12 different staff and supervisory-level laboratory occupations, they do not survey faculty.⁵ However, according to the U.S. Department of Labor, Bureau of Labor Statistics the top four industries that employ medical laboratory scientists include: 1. Medical and surgical hospitals, 2. Medical and diagnostic laboratories, 3. Physician offices, and 4. Colleges, universities and professional schools.⁶

The curriculum will be designed to address these important issues and areas of study. The master's level laboratory professional is a nationally credentialed health care professional who can be employed in leadership and clinical practice, health care administration, environmental health, industry, infection control, institutional health care safety, epidemiology, human genetic laboratories, education, industry (i.e., medical equipment and supplies manufacturing and sales,

¹ Harvard Medical School, Unnecessary Testing: Study finds inappropriate laboratory testing throughout medicine. <https://hms.harvard.edu/news/unnecessary-testing-11-18-13>.

² United States Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/ooh/healthcare/medical-and-clinical-laboratory-technologists-and-technicians.htm>.

³ South Dakota Department of Labor and Regulation <https://www.sdvlmi.com/vosnet/lmi/occ/occsunsummary.aspx>

⁴ The Medical Laboratory Personnel Shortage, <https://www.ascp.org/content/docs/default-source/pdf/57723a0c-bd18-473c-be76-d66b52ae5594.pdf>

⁵ Building a laboratory workforce to meet the future: ASCP Taskforce on the Laboratory's Professional Workforce. <https://academic.oup.com/ajcp/article/141/2/154/1760592/Building-a-Laboratory-Workforce-to-Meet-the>

⁶ United States Department of Labor, Bureau of Labor Statistics, <http://www.bls.gov/ooh/healthcare/medical-and-clinical-laboratory-technologists-and-technicians.htm>

management or scientific and technical consulting) and clinical research. The master's program at SDSU will be designed to provide a quality education program in laboratory science for students that currently hold a baccalaureate degree in Biology, Chemistry, Health Sciences, Human Biology, and Medical Laboratory Science. The program would provide the core curriculum in all the areas of the laboratory, as well as a specialization in Molecular Diagnostics. The MLS program would seek accreditation for the specialization in Molecular Diagnostics following the completion of the development of the MLS master's program.

The University does not request new state resources.

2. What is the need for the proposed program (e.g., Regental system need, institutional need, workforce need, etc.)? What is the expected demand for graduates nationally and in South Dakota (provide data and examples; data sources may include but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc.)?

Advanced laboratory science practitioners are needed in South Dakota and the Northern Plains and Midwest regions to fill leadership positions and to maintain the quality of health care due to retirements and the rapidly expanding and complex medical field. The SD Public Health Workforce summary completed by the SD Department of Health explicitly indicates that the state of SD will need an additional 43 medical laboratory science professionals annually each year from 2012 to 2022.⁸ The three major health care providers in SD either currently provide a variety of molecular diagnostics or are implementing and expanding their diagnostic capabilities in molecular diagnostics, pharmacogenomics and personalized medicine.⁷ In addition, the SD Public Health Workforce summary also indicates that more laboratory scientists are needed when compared to any other health care professional in the State, and remain the highest needed health care professional in the Governor's 2018 initiative.⁸ However, these data do not highlight the specific concerns related to the advance practice roles and technical specialty areas of the laboratory science profession.

3. How would the proposed program benefit students?

The curriculum will be designed to prepare advanced practitioners as well as leaders in the health care profession and in higher education. The Medical Laboratory Science program will include didactic and experiential learning in the core areas of hematology, immunohematology, microbiology, chemistry, microbiology, molecular diagnostics, laboratory science education, and management. This program would provide the graduates of the master's program the opportunity to obtain a national American Society of Clinical Pathology (ASCP) specialty certification within any laboratory science core (i.e., hematology, immunohematology, microbiology, chemistry or molecular diagnostics). An advanced degree or specialty certification is often required for a laboratory professional to serve as a technical supervisor or lead technical specialist in a diagnostic laboratory. In addition, there is a significant difference in the salary for a baccalaureate to master's level laboratory professional. In 2016, a nationally ASCP certified MLS baccalaureate prepared educator earned approximately \$61,823 and a Master's prepared professional earned \$70,570.⁹ In addition, the average base salary for a master's prepared molecular diagnostics specialist was

⁷ Personnel Communications P. Tille Ph.D.MLS(ASCP)FACSc; SDSU MLS Program Director: Mike Black M.B.A. Avera Regional Laboratory, Sioux Falls SD; Megan Landverks Ph.D. Sanford Health Medical Genetics, Sioux Falls SD and Brendon Sato MBA MLS(ASCP), Rapid City Regional Laboratory, Rapid City SD.

⁸ South Dakota Department of Health Workforce Summary, <https://doh.sd.gov/documents/Providers/RuralHealth/2015WorkforceReport.pdf>

⁹ Salary Survey: Clinical Laboratory Science Journal, Vol 29 No2 Spring 2016.

reported as \$87,200 to \$96,495 for a doctoral level professional and a clinical supervisor with advanced specialty training or education in the other disciplines averaged an annual salary of approximately \$80,183.⁹

4. How does the proposed program relate to the university's mission as provided in South Dakota Statute and Board of Regents Policy, and to the current Board of Regents Strategic Plan 2014-2020?¹⁰

The proposed M.S. in Medical Laboratory Science supports the statutory mission of SDSU as provided in SDCL 13-58-1: *Designated as South Dakota's land grant university, South Dakota State University, formerly the state college of agriculture and mechanical arts, shall be under the control of the Board of Regents and shall provide undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, home economics, nursing and pharmacy, and other courses or programs as the Board of Regents may determine.*

Board Policy 1:10:2 South Dakota State University Mission Statement provides: *The legislature established South Dakota State University as the Comprehensive Land Grant University to meet the needs of the State and region by providing undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, human sciences, nursing, pharmacy, and other courses or programs as the Board of Regents may determine (SDCL 13-58-1).*

The proposed program aligns with the goals stated in the South Dakota Board of Regents Strategic Plan 2014-2020:

Goal 1 – Student Success

- Increase total graduate degrees awarded.

Goal 2 – Academic Quality and Performance

- Grow the number of new graduate programs.

Goal 3 – Research and Economic Development

- Expand STEM education opportunities.
- Promote research.
- Contribute to the state's workforce and economic development.

The M.S. in Medical Laboratory Science also supports South Dakota State University's strategic plan, IMPACT 2018¹¹, specifically:

Goal 1 – Academic Excellence

- Promote academic excellence through quality programs, engaged learners and an innovative teaching and learning environment.

Goal 2 – Research and Innovation

- Generate new knowledge, encourage innovations and promote artistic and creative works that contribute to the public good and result in social, cultural or economic development for South Dakota, the region, the nation and the world.

¹⁰ South Dakota statutes regarding university mission are located in SDCL 13-57 through 13-60; Board of Regents policies regarding university mission are located in Board Policies 1:10:1 through 1:10:6. The Strategic Plan 2014-2020 is available from https://www.sdbor.edu/the-board/agendaitems/Documents/2014/October/16_BOR1014.pdf.

¹¹ <https://www.sdstate.edu/impact-2018-strategic-vision-south-dakota-state-university>

5. Do any related programs exist at other public universities in South Dakota? If a related program already exists, explain the key differences between the existing programs and the proposed program, as well as the perceived need for adding the proposed new program. Would approval of the proposed new program create opportunities to collaborate with other South Dakota public universities?¹²

None

6. Do related programs exist at public colleges and universities in Minnesota, North Dakota, Montana, and/or Wyoming? If a related program exists, enter the name of the institution and the title of the program; if no related program exists, enter "None" for that state. Add additional lines if there are more than two such programs in a state listed.¹³

	Institution	Program Title
<i>Minnesota</i>	None	
<i>North Dakota</i>	University of North Dakota	M.S. in Medical Laboratory Science
<i>Montana</i>	None	
<i>Wyoming</i>	None	

7. Are students enrolling in this program expected to be new to the university or redirected from other existing programs at the university?

Students who choose to pursue this major may be new to SDSU, may be currently pursuing a major in the current SDSU B.S. in Medical Laboratory Science or pursuing a degree in chemistry, biology, human biology or other related health science major. The program expects approximately eight new students and two students redirected from the current B.S. in Medical Laboratory Science. Since inception, the baccalaureate program has an average of two students enrolled annually in the professional program that already have a degree in biology, microbiology, chemistry or other allied health science.

8. What are the university's expectations/estimates for enrollment in the program through the first five years? What are the university's expectations/estimates for the annual number of graduates from the program after the first five years? Provide an explanation of the methodology the university used in developing these estimates.

The MLS program expects to enroll ten students per year with the first five years and expects to graduate ten students per year after the first five years. The enrollment limitations are based on space, instrumentation and faculty availability. SDSU's B.S. in Medical Laboratory Science maintains an attrition rate of < 2% overall; a similar, very low attrition rate is predicted for the MS MLS.

¹² Lists of existing system programs are available through university websites and the RIS Reporting: Academic Reports database available from <http://apps.sdbor.edu/ris-reporting/AcademicProgramReports.htm>.

¹³ This question addresses opportunities available through Minnesota Reciprocity and WICHE programs such as the Western Undergraduate Exchange and Western Regional Graduate Program in adjacent states. List only programs at the same degree level as the proposed program. For example, if the proposed program is a baccalaureate major, then list only related baccalaureate majors in the other states and do not include associate or graduate programs.

9. Complete the following charts to indicate if the university intends to seek authorization to deliver the entire program at any off-campus location (e.g., UC Sioux Falls, Capital University Center, Black Hills State University-Rapid City, etc.) or intends to seek authorization to deliver the entire program through distance technology (e.g., as an on-line program)?¹⁴

	Yes/No	If Yes, list location(s)	Intended Start Date
Off-campus	No		

	Yes/No	If Yes, identify delivery methods	Intended Start Date
Distance Delivery	No		

10. What are the university’s plans for obtaining the resources needed to implement the program? Indicate “yes” or “no” in the columns below.

	Development/ Start-up	Long-term Operation
Reallocate existing resources	Yes	Yes
Apply for external resources	No	No
Ask Board to seek new State resources ¹⁵	No	No
Ask Board to approve a new or increased student fee	Yes	Yes

The MLS Master’s program would be supported by the same existing program fee schedule as the current MLS B.S. level program fee. The fee is \$1,686.70 per semester.

11. Curriculum Example: Provide (as Appendix A) the curriculum of a similar program at another college or university. The Appendix should include required and elective courses in the program. Catalog pages or web materials are acceptable for inclusion. Identify the college or university and explain why the selected program is a model for the program under development.

There are very few master’s level medical laboratory science programs that are NAACLS accredited. This is because NAACLS does not provide specific accreditation for this level. NAACLS, however, does provide accreditation for a specialty master’s program in Molecular Diagnostics. Because of this, the existing master’s programs have quite a diverse structure, including curriculum, admissions requirements and advanced learning experiences that may or may not include a clinical requirement. Therefore, the Diagnostic Genetics program at University of Texas - MD Anderson is used here as an example of a NAACLS accredited program with acceptable admission criteria, curriculum design and capstone experiences. (See Appendix A)

¹⁴ The accreditation requirements of the Higher Learning Commission (HLC) require Board approval for a university to offer programs off-campus and through distance delivery.

¹⁵ Note that requesting the Board to seek new State resources may require additional planning and is dependent upon the Board taking action to make the funding request part of their budget priorities. Universities intending to ask the Board for new State resources for a program should contact the Board office prior to submitting the intent to plan.

Appendix A

Curriculum Example: University of Texas - MD Anderson - M.S. in Diagnostic Genetics

Additional information regarding the M.S. in Diagnostics Genetics may be found at:
<https://www.mdanderson.org/education-training/degrees-programs/school-of-health-professions/academics/diagnostic-genetics.html>

Applicants to the Program in Diagnostic Genetics must satisfy the following requirements for admission:

- **Bachelor degree** in biological sciences, biochemistry, chemistry, or related majors with emphasis on genetics/biochemistry courses.
- **All prerequisite course work** must be from a regionally accredited college or university. Physical education and military science courses are not acceptable for prerequisite credit.
- **Minimum grade point average of 3.0 on a 4.0 scale** is required to be considered for admission. GPA may be evaluated by the following: overall, science and mathematics course work, and last 60 hours or combinations of all of the above. Special circumstances may be considered, but at the discretion of the Admissions Committee.
- **Applicants holding current Clinical Certification** through the American Society for Clinical Pathology (ASCP) in MB, CG, or MLS are exempt from taking the Graduate Record Exam (GRE). [Proof of ASCP Certification](#) should be submitted in order to claim this exemption from taking the GRE.
- **Applicants without ASCP Clinical Certification in the above fields** must take the General Test of the Graduate Record Examinations (GRE) that includes the analytical portion. NOTE: The GRE Designated Institution Code for The University of Texas MD Anderson Cancer Center is **0490**
- **Applicants with previous graduate degrees**, e.g. PhD or MS, may request a waiver of the GRE at the discretion of the Admission's Committee

Prior Course work and Experience

The following courses are strongly recommended:

- Prior Undergraduate or graduate course work in:
 - Molecular Biology
 - Biology
 - Genetics
 - Microbiology
 - Chemistry/ Organic Chemistry
 - Basic Research Techniques
 - Human Physiology
 - Evolutionary Biology

Curriculum

An integral part of the MS curriculum is pursuing applied (clinical and basic translational) research. Students are required to select and identify their program mentors and related research laboratories during the first semester of the program. The curriculum includes didactic course work followed by directed clinical training at affiliated hospitals and laboratories.

DG 6100 Clinical Research Seminar I	1
DG 6101 Clinical Research Seminar II	1
DG 6102 Clinical Investigative Design/Analysis	1
DG 6280 Concepts in Molecular Diagnostics	2
DG 6290 Clinical Diseases and Applications of Molecular Genetics	2
DG 6301 Advanced Practice I	3
DG 6320 Bioinformatics I	3

DG 6333 Quantitative Research and Advanced Statistics	3
DG 6340 Bioinformatics II	3
DG 6390 Applied Molecular Diagnostic Techniques	3
DG 6401 Advanced Practice II	4
DG 6501 Advanced Practice III	5
DG 6510 Diagnostic Molecular Laboratory Techniques Lab	5
DG 6560 Clinical Molecular Rotation I	5
DG 6570 Clinical Molecular Rotation II	5
Total	46